Emerging Information Technologies: Developing A Timely IT Strategy

A model for quickly sifting through emerging technologies to find the best organizational fit.

CASEY G. CEGIELSKI, BRIAN J. REITHEL, AND CARL M. REBMAN

Technology executives tend not to consider the integration of emerging information technologies (EITs)—innovations with incomplete standardization or limited commercial accessibility (such as beta versions of software or prototypes of hardware)—when planning an IT strategy. A survey of 212 CIOs from Fortune 1000 firms revealed that only 31% of the respondents evaluated an EIT during a recent IT strategic planning session [3]. Of the responding CIOs who had not explored the possibilities of EITs in their IT strategic planning phase, 68% indicated they lacked sufficient time during strategy planning to explore and acquire knowledge regarding EITs as potential components of their respective IT strategy [3]. This is unfortunate, since more than half of those CIOs who did not consider EITs in their recent strategic planning sessions stated that such consideration might have contributed to the development of a more timely IT strategy [3].

Given these survey results, we offer several insights and an evaluation model that CIOs can utilize to organize an expedient investigation of an emerging technology’s potential fit into organizational IT strategy.

The surveyed executives indicated unanimously that access to information regarding EITs and the time resources required to evaluate the new technologies are critical preliminary evaluation factors [1, 3]. In order to expedite the data collection process and subsequent evaluation process, the study participants offered the following recommendations:

- Review new technologies on a continuous basis. Each week allocate time to investigating what’s new.
- Create lasting resource files. A new technology may not provide potential value to your organization today, but tomorrow may be a different story.
- Define your existing business processes and...
Business Alignment Examples
Gain/Sustain Competitive Advantage

General Questions: Can the technology foster greater organizational efficiencies in areas such as production cycle time or inventory control? Can the technology provide additional useful information to those who need to make timely decisions?
Specific Application: What is the estimated payback period for our ERP implementation if we are able to reduce our inventory carrying cost by $1 million per quarter?

Appropriate for Use by External Entities

General Questions: Will the technology disrupt current client/supplier/regulatory relationships? Specific Application: Will the EPA accept our reports in XML?

Technical Alignment Examples
Current/Future Uses for Technology

General Questions: What aspects of the technology are usable today? Tomorrow? Specific Questions: Will the new Open Source Office Suite support our current document standards? In the future, we will require integration with our project management software. Is it possible with the new Open Source Office Suite?

Performance Aspects of Technology

General Questions: How secure, robust, and reliable is the technology? Specific Questions: For e-transmission of our patient records, we must use 128-bit encryption. Does the wireless network allow such a configuration?

Compatible with Current/Future Business Operations

General Questions: Can we continue to conduct business in our current fashion? Will this technology support our planned future objectives? Specific Questions: Is the technology able to support current product distribution process? Will the technology support the business's planned development of a South American production division?

Systems Compatibility of Technology

General Questions: Can the technology be seamlessly integrated with our existing systems? Specific Questions: Our transaction processing system runs on a AS/400. Will the proposed Web portal software be capable of querying data from that system?

Begın At the Beıgnıng

To ground our evaluation model, we conducted a four-round Web-based Delphi study. Seventy-five senior IT executives, who classified their organization's IT strategy as “innovative” based on their previous use of EITs, participated in the study. Initially, each executive read three separate vignettes describing a different technology (Bluetooth, XML, and Virtual Retinal Display) that qualified, per the definition described herein, as an EIT. Next, each executive contributed, via the study Web pages, his or her thoughts regarding the potential integration of the sample EIT into corporate strategy. Finally, the executives reviewed all 169 of the unique comments and formulated a set of 23 unique issues they perceived as important with respect to integrating EITs into corporate strategy. In subsequent rounds, the group ranked and re-ranked the issues to produce a consensus of the most important issues to consider when contemplating the integration of EITs into IT strategy (see Table 1).

Qualitative feedback collected via a series of online chat sessions with the study participants revealed that the overwhelming majority of the participating executives believe the integration decision of EITs is stratified into two separate but interrelated assessment areas: business alignment issues and technical alignment issues. Interestingly, alignment, in numerous facets, was noted as a key issue in IT strategy in several previous research studies [2]. According to a global IT firm CIO, whose sentiments were widely supported by the group, the two areas differ in that “business issues address the general ways and means that a particular technology will support an organization’s objectives,” while

<table>
<thead>
<tr>
<th>Issue</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to gain competitive advantage through the use of the EIT</td>
<td>1</td>
</tr>
<tr>
<td>Ability to sustain competitive advantage provided by the EIT</td>
<td>2</td>
</tr>
<tr>
<td>Security aspects involved with using the EIT</td>
<td>3</td>
</tr>
<tr>
<td>Appropriateness of EIT for use by customers/clients</td>
<td>4</td>
</tr>
<tr>
<td>Reliability of the technology</td>
<td>5</td>
</tr>
<tr>
<td>Compatibility of EIT with existing information systems</td>
<td>6</td>
</tr>
<tr>
<td>Supports current business operations/processes</td>
<td>7</td>
</tr>
<tr>
<td>Capable of supporting future business process/operations</td>
<td>8</td>
</tr>
<tr>
<td>Standardization of technical specifications of the EIT</td>
<td>9</td>
</tr>
</tbody>
</table>

Table 1. Consensus ranking of top issues from final Delphi round (1 = most important).
Most of the participants expressed competitive advantage not in terms of a single application of technology that produces a benefit for a finite amount of time, but rather as a continuous effort to manage the integration of technologies as they develop.

The consensus ranking of the top issues presented in Table 1 illustrates a clear distinction between business and technical alignment. Particularly, Issues 1, 2, 4, 7, and 8 represent business alignment issues while Issues 3, 5, 6, and 9 pertain to technical alignment issues. While the group saw both areas as “equally important,” a consensus formed among the executives that the integration decision regarding EITs must focus initially on business alignment issues in order to ensure support for organizational objectives. A CIO from an international petrochemical conglomerate summarized the group sentiment as follows:

“It is easy to become fascinated by cutting-edge technologies, but we all know the bottom line. If it [an emerging information technology] won’t make us better at what we do, than it has no place in our organization.”

From the initial listing of 23 unique issues and the subsequent executive classifications solicited during the online chat sessions, we developed the EIT evaluation model presented in Figure 3.

**BUSINESS ALIGNMENT ISSUES**

Many practitioners and researchers have long held the popular opinion that competitive advantages derived from using IT are often short-lived because of the ability of competitors to replicate, and subsequently eliminate, the advantage [4, 5]. The participating CIOs unanimously agreed that gaining and subsequently sustaining a competitive advantage via the integration of an EIT into strategy are paramount concerns in the EIT evaluation process. Interestingly, most of the participants expressed competitive advantage not in terms of a single application of technology that produces a benefit for a finite amount of time, but rather as a continuous effort to manage the integration of technologies as they develop. Given this information, we have modularized competitive advantage into the single components shown in the model.

According to the executive respondents, the sec-
ond business alignment issue to consider when evaluating an EIT is the appropriateness of the technology for the organization’s customers or clients. The former CIO of an international women’s fashion retailer explained his perception of appropriateness of technology with the following example:

“We evaluated an e-commerce plan prior to 1996. It was a comprehensive plan we had on the table and it would have been costly. We learned from preliminary market studies that our customers would not purchase our clothes online. For them, there is a need to see and feel a garment before they buy. They like to come into the store and try it on, see it in the mirror, and get some opinions on how it makes them look. Because of that, we decided not to incorporate an e-commerce platform in our Web presence. I’ll also tell you that watching all of our competition move to e-commerce platforms made us all worry. We wondered if we had made the right decision. Five years after, we know our assessment of our customers was right on. I know that our competitors haven’t experienced the kind of return on their sites that they expected. We know it all boils down to our customers’ preferences.”

Within the domain of business alignment, the respondents defined business operations compatibility as the final qualitative issue to consider when evaluating an EIT. One CIO suggested that by appropriately evaluating the compatibilities of an EIT with current and future organizational operations, an IT strategist can avoid the difficult lesson learned by so many adopters of ERP systems in the late 1990s: integrating technology for the sake of technology is a poor approach to developing an IT strategy. The overriding theme expressed by the group regarding EITs and operations compatibility is the paramount importance of ensuring that organizational operations are not altered solely to allow for technology integration. While all agreed that it is completely acceptable to utilize technology to facilitate organizational change, attempts to conform organizational processes around an EIT are tantamount to placing the cart in front of the horse [6].

**TECHNICAL ALIGNMENT ISSUES**

According to the study group, once an IT strategist has completely assessed the business alignment issues regarding an EIT, it is appropriate to explore the relevant technical issues of the emerging technology. Initially, the technical analysis should focus on the current and future uses of the EIT within the organization. The CIO of an international paper products manufacturer explained the analysis of potential uses of an EIT as a “proactive”

Most of the executives indicated that the key to future use of an emerging technology is the analysis of the wealth of information available from technology developers.
activity. Several of the group participants suggested that identifying future uses of an EIT is very difficult because of the nature of technology evolution. The CTO of an international logistics firm summarized the problem as follows:

“One problem with anticipating future uses of technologies is that developments can take place like an explosion, but it usually takes time for support to catch up. Look at ISDN. The technology was developed long before the rules were ever worked out. By the time everybody finally agreed on the standards, ISDN was an afterthought for broadband.”

Although the identification of future uses of an EIT requires some forecasting, most of the executives in the study indicated that the key to future use assessment of an emerging technology is the analysis of the wealth of information available from technology developers.

The final two assessment areas in the EIT evaluation model are components of technical alignment: performance issues and systems compatibility issues. Performance issues collectively reflect the myriad of technology specifications of an EIT. For example, many of the participating executives were particularly concerned about the technical security factors associated with new technologies. Given the events of Sept. 11, 2001, the concern for security is understandable. However, performance issues also include other technical areas such as product reliability, particularly with respect to hardware and end-user training for new software. Systems compatibility issues, on the other hand, center on the specifics of integrating an EIT into an organization’s existing IT infrastructure. Most of the systems compatibility issues focused on specific areas such as cross-platform connectivity, software application integration, deployment, and product support.

**Conclusion**

Given the rate of technological evolution, the exclusive use of currently available commercial technologies often creates a rapidly outdated IT strategy. It may be useful for technology executives to apply the model presented herein to remedy this problem. In doing so, a CIO should first focus on the business alignment issues and conduct exploratory research to identify whether an EIT can be leveraged into a competitive advantage through enhanced operating efficiency, greater access to markets, or otherwise. Typically, this task requires the CIO to visualize his or her organization as it competes with its rivals in the global marketplace. Next, and assuming some competitive advantage may be obtained via integrating an EIT, a CIO must determine whether the technology is appropriate for his or her user base. One can accomplish this through a formal or informal survey. Finally, the CIO considering the EIT must subjectively decide if the new technology will fit within the current as well as long-range operational plan of the firm. Often, this step requires the CIO to discuss operational objectives with other executive directors as well as operations level managers. After the business alignment issues have been addressed, the CIO, with the help of IT staff, may assume the responsibility of conducting a technical fit analysis for the EIT.

Using the model presented herein, IT executives can work toward the creation of a more timely IT strategy by quickly assessing the potential fit of emerging information technologies within a firm-specific context. As a result, forward-looking IT strategies that capitalize on early innovation are developed. The net effect is a longer useful life for an IT strategy.

**References**

3. Cegielski, C.G. and Rebman, C.M. Building a timely information technology strategy: A process to efficiently acquire decision useful information regarding emerging information technologies. *Issues in Information System* 4, 1 (Fall 2003), 52–58.

_____

**Casey G. Cegielski** (casey@business.auburn.edu) is an associate professor of MIS in the College of Business at Auburn University. **Brian J. Reithel** (reithel@bus.olemiss.edu) is the dean of the School of Business and a professor of MIS at the University of Mississippi. **Carl M. Rebman** (carl@sandiego.edu) is an assistant professor of Information Systems and Electronic Commerce at the University of San Diego.

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, to republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.